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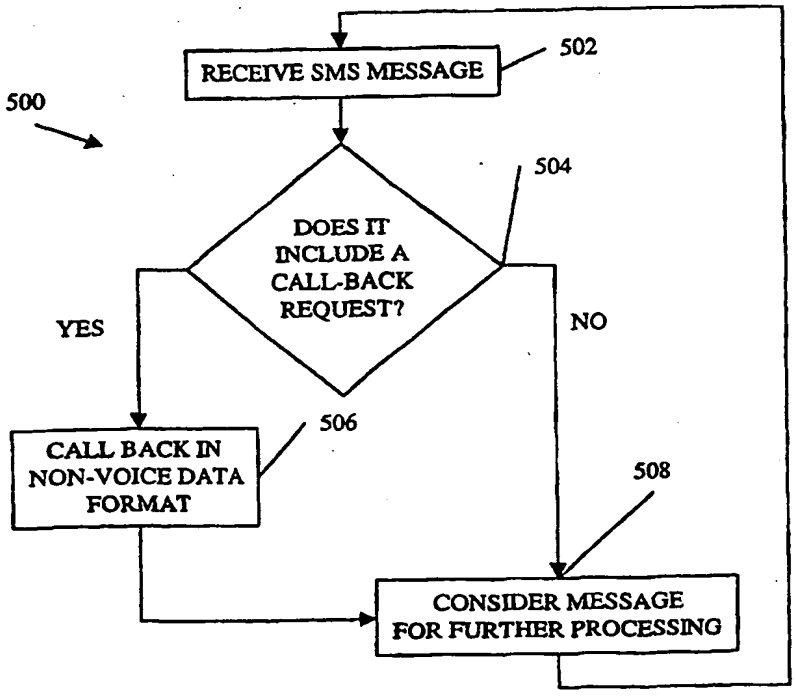
(54) Title: SMS INITIATION OF A DATA CALL

(57) Abstract

A host computer (106) wants to send non-voice data to a wireless terminal (102). It does so by sending a Short Message Service (SMS) message over signaling network (302) to wireless terminal (102) requesting a call-back. In response to this SMS message, wireless terminal (102) sends non-voice data back to wireless infrastructure (104), and thus calls the host computer (106) back.



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SMS INITIATION OF A DATA CALL

I. Technical Field

This invention relates to wireless digital telephony, and has particular relation to establishing non-voice data communication with a wireless terminal.

II. Background Art

As shown in FIG. 1, a conventional network 100 can connect a wireless terminal 102, via wireless infrastructure (base stations, etc.) 104, to a host computer 106 by using either of two routes. In both routes, the wireless terminal makes a non-voice digital wireless connection to the wireless infrastructure 108. The difference in routes comes from what the wireless infrastructure 108 does to the non-voice signal.

The "non-voice" qualification is important. The wireless telephone system is, as noted above, digital. Thus, both voice and non-voice data are carried in a digital format. The two digital formats are different, though. The voice format tolerates more errors in order to minimize delay, while the non-voice format tolerates more delay in order to minimize errors.

In the first route, the wireless infrastructure 104 applies the signal as circuit switched data to a first modem 108, which modulates it as it enters a circuit switched network 110 (conventionally, the Public Switch Telephone Network, or PSTN). The PSTN 110 applies the modulated signal to a second modem 112, which demodulates it as it leaves the PSTN 110 and applies the demodulated signal to the host computer 106.

In the second route, the wireless infrastructure applies the signal as packet data to an interworking function 114, which applies the interworked data to the Internet 116, which applies it to the host computer 106.

Both routes work well when the wireless terminal 102 wants to initiate a data connection with the host computer 106, since the host has a fixed electronic address, both on the PSTN 110 and on the Internet 116.

As shown in FIG. 2, neither route works well when the network works in reverse 200. Now it is the host computer 106 which wants to initiate the data connection, but it does not know where the wireless terminal 102 is, that is, which base station or other part of the wireless infrastructure 104 is in direct connection with the wireless terminal 102. It thus has no electronic address for the wireless terminal 102. Various Mobile Internet Protocols have been proposed, but it will be a fairly long time before the Internet is upgraded to address this situation. The telecommunications industry can't wait that long; it needs something now.

BRIEF DISCLOSURE OF THE INVENTION

FIG. 3 shows the chink in the prior art's armor which applicant has used to overcome this problem, without expensive infrastructure upgrades. Applicant has noticed that the PSTN 110 has both a signaling network 302 (conventionally, Signaling System 7, or SS7) and a traffic network 304. SS7 302 locates both ends of the conversation (in this case, the two modems 108 and 112) and ensures that a circuit switched connection can be made through the traffic network 304 before attempting to set up such a connection. Since SS7 302 requires much less bandwidth than the traffic network 304, the entire PSTN 110 works much more efficiently.

SS7 302 has, as networks technology evolved, been pressed into additional uses, which include mobility management through Mobile Application Parts (MAP) such as, for example IS-41. These are in addition to its initial use, in fixed wireline and tandem networks, in which a conventional SS7 signal tells a receiving signaling point, in effect, "Please alert the terminal; the traffic network is ready to complete a call as soon as your handset goes off-hook."

One of these value-added additional uses, which MAPs bring to the network, is the Short Message System (SMS). SMS, in effect, locates a

mobile terminal and sends to it a message, similar to a pager, "Please alert user; please also show the following n characters on your display unit, ready to be seen when your customer next has the chance to look." Small messages have been deemed to be an acceptable burden on SS7 302, yet it both avoids a full bandwidth telephone call and generates revenue for the operating company. It thus occupies a valuable middle ground between an unanswered call (no revenue) and a call answered by an answering machine (full revenue, but reduced service to the customer).

Applicant has noted that the MAP of SS7 302 is fully mobile, and that the host computer could thus easily send an SMS message to the wireless terminal. The SMS message could state, "Call the host computer back (here stating the host's PSTN number or Internet address), using non-voice format." That is, the host computer does not initiate the non-voice data connection. Instead, it takes advantage of the wireless terminal's ability to initiate a non-voice data connection, and asks — by means of an SMS message — the wireless terminal to do so.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is block diagram 100 of a wireless terminal 102 conventionally succeeding in communicating with a host computer 106.

FIG. 2 is block diagram 200 of the host computer 106 conventionally attempting (and failing) to communicate with the wireless terminal 102.

FIG. 3 shows the internal structure of the conventional Public Switch Telephone Network 110.

FIG. 4 is a block diagram 400 of a wireless terminal 404 including a novel SMS call-back element 410.

FIG. 5 is a flow chart 500 showing the operation of the apparatus of FIG. 4.

DETAILED DESCRIPTION OF DRAWINGS

FIGS. 1-3 show the prior art and have been adequately discussed above.

In FIG. 4, the conventional wireless terminal 102 has been modified into a novel wireless terminal 402. Terminal 402 receives wireless signals through antenna 404, which applies them to a receiver 406. Receiver 406 passes these signals to an SMS call-back element 408.

The SMS call-back element 408 is so called because it looks for control signals from the signaling network 302. As noted above, it is conventional for this signaling network 302 to be a Mobile Application Part conveyed over signaling system #7. If it is, then one possible MAP control signal is a message in Short Message Service (SMS) format. Such a message may readily be coded (through use of Teleservice identities or some other novel encoding format) to indicate that it is a call-back message, and include a designation of the host computer 106 which is to be called back. The call-back element 408 passes this information on to a processor 410, which may be fully automatic or under the control of the terminal user. This processor 410 causes a transmitter 412 to initiate a data call through antenna 404. The receiving and transmitting antennas may be separate if desired.

Other control signals may be used instead of SMS messages if desired. This is not preferred. If an SMS message is used, then only the host computer 106 and wireless terminal 102 need to be upgraded to send and process the call-back signal, and this upgrade might be nothing more than a software change. The infrastructure 104 and networks 110 and 116 may be left unchanged. If a new control signal is used, expensive changes may be required.

FIG. 5 is a flow chart 500 showing the operation of the apparatus of FIG. 4. The wireless terminal 102 receives 502 an SMS message. It then determines 504 whether the message includes a call-back request. If it does 506, then it calls the host computer 106 back, using non-voice data format. If

not 508, then the message is considered for further processing, and the next message is received 502.

Industrial Application

This invention is capable of exploitation in industry, and can be made and used, whenever is it desired for a host computer to establish non-voice data communication with a wireless terminal. The individual components of the apparatus and method shown herein, taken separate and apart from one another, may be entirely conventional, it being their combination which I claim as my invention.

While I have describe various modes of apparatus and method, the true spirit and scope of our invention is not limited thereto, but is limited only by the following claims and their equivalents, and I claim such as my invention.

What is claimed is:

CLAIMS

1) In a network including:

a) a host computer;

b) a wireless terminal;

c) a signaling network adapted to connect the host computer and the wireless terminal; and

d) a traffic network adapted to connect the host computer and the wireless terminal;

the improvement comprising a method for the host computer to establish non-voice data communication with the wireless terminal, the method comprising the steps of:

e) the host computer sending a call-back message to the wireless terminal over the signaling network; and

f) the wireless terminal, in response to the call-back message, initiating a data call back the host computer in non-voice data communication mode over the traffic network.

2) The method of Claim 1, wherein the signaling network comprises signaling system #7.

3) The method of Claim 2, wherein the call-back message comprises a Short Message Service (SMS) message.

4) The method of Claim 1, wherein:

a) the traffic network comprises a circuit switched network; and

b) the method further comprises the steps of modulating the data call as it enters the traffic network, and demodulating the data call as it leaves the traffic network.

5) The method of Claim 4, wherein the circuit switched network comprises the public switched telephone network.

6) The method of Claim 1, wherein the traffic network comprises a packet switched network.

7) The method of Claim 6, wherein the packet switched network comprises the Internet.

8) In a network including:

a) a host computer;

b) a wireless terminal;

c) a signaling network adapted to connect the host computer and the wireless terminal; and

d) a traffic network adapted to connect the host computer and the wireless terminal;

the improvement comprising apparatus for the host computer to establish non-voice data communication with the wireless terminal, the apparatus comprising:

e) means for the host computer to send a call-back message to the wireless terminal over the signaling network; and

f) means for the wireless terminal, in response to the call-back message, to initiate a data call back to the host computer in non-voice data communication mode over the traffic network.

9) The apparatus of Claim 8, wherein the signaling network comprises signaling system #7.

10) The method of Claim 9, wherein the call-back message comprises a Short Message Service (SMS) message.

11) The apparatus of Claim 8, wherein:

a) the traffic network comprises a circuit switched network; and

b) the apparatus further comprises a first modem connected to modulate the data call as it enters the traffic network, and a

second modem connected to demodulate the data call as it leaves the traffic network.

12) The apparatus of Claim 10, wherein the circuit switched network comprises the public switched telephone network.

13) The apparatus of Claim 8, wherein the traffic network comprises a packet switched network.

14) The apparatus of Claim 13, wherein the packet switched network comprises the Internet.

15) A wireless terminal, further comprising:

a) means for receiving a call-back message to the wireless terminal from a host computer over a signaling network; and

b) means, in response to the call-back message, for initiating a data call back to the host computer in non-voice data communication mode over a traffic network.

16) The apparatus of Claim 15, wherein the signaling network comprises signaling system #7.

17) The method of Claim 16, wherein the call-back message comprises a Short Message Service (SMS) message.

18) The apparatus of Claim 15, wherein:

a) the traffic network comprises a circuit switched network; and

b) the apparatus further comprises a first modem connected to modulate the data call as it enters the traffic network, and a second modem connected to demodulate the data call as it leaves the traffic network.

19) The apparatus of Claim 18, wherein the circuit switched network comprises the public switched telephone network.

20) The apparatus of Claim 15, wherein the traffic network comprises a packet switched network.

21) The apparatus of Claim 20, wherein the packet switched network comprises the Internet.

FIG. 1
PRIOR ART

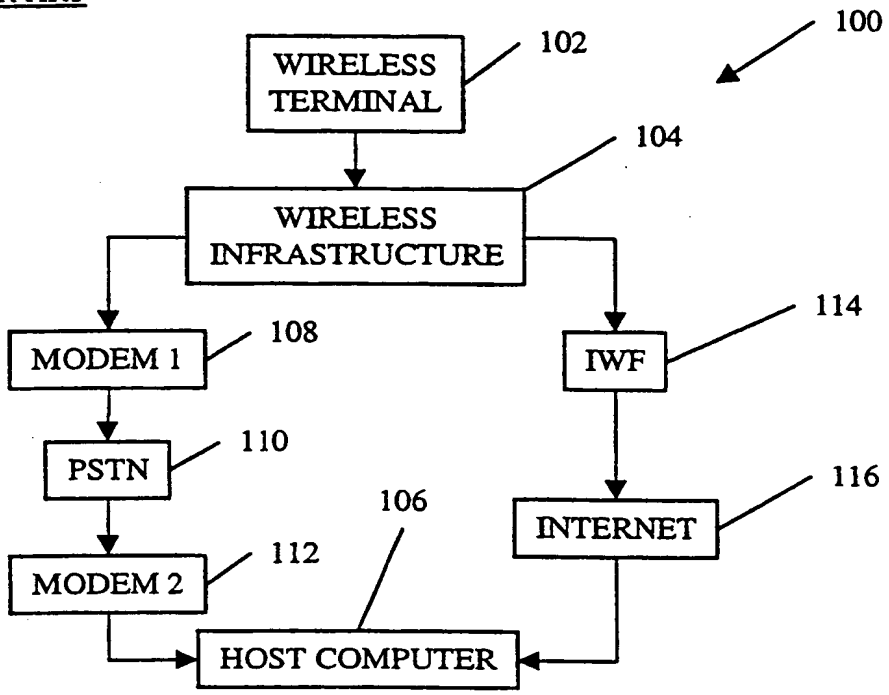


FIG. 2
PRIOR ART

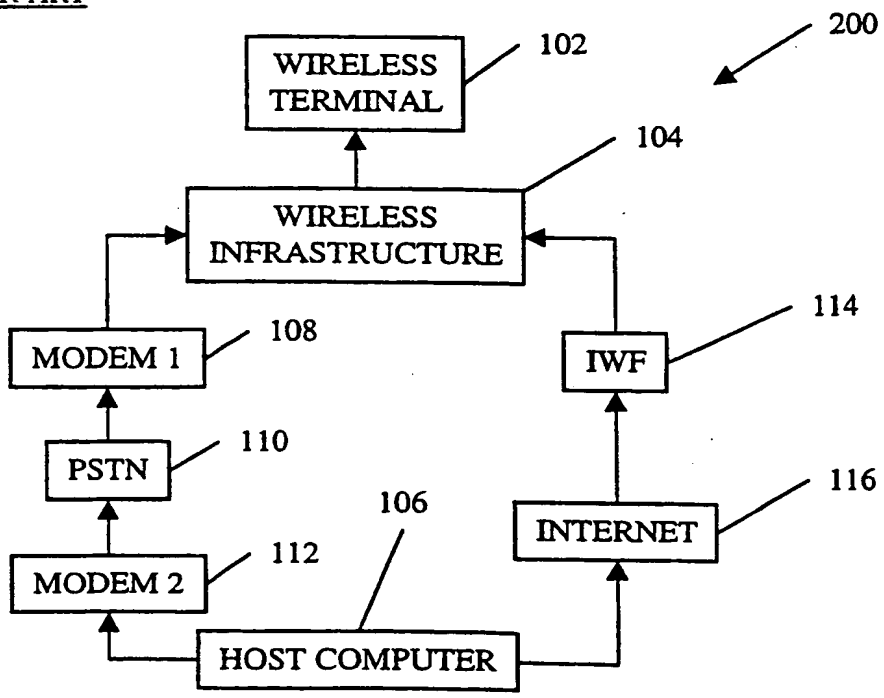


FIG. 3
PRIOR ART

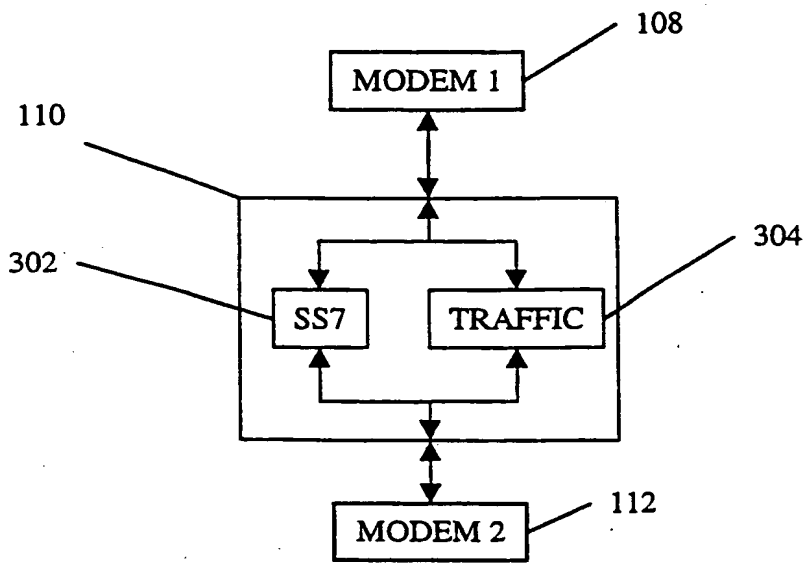


FIG. 4

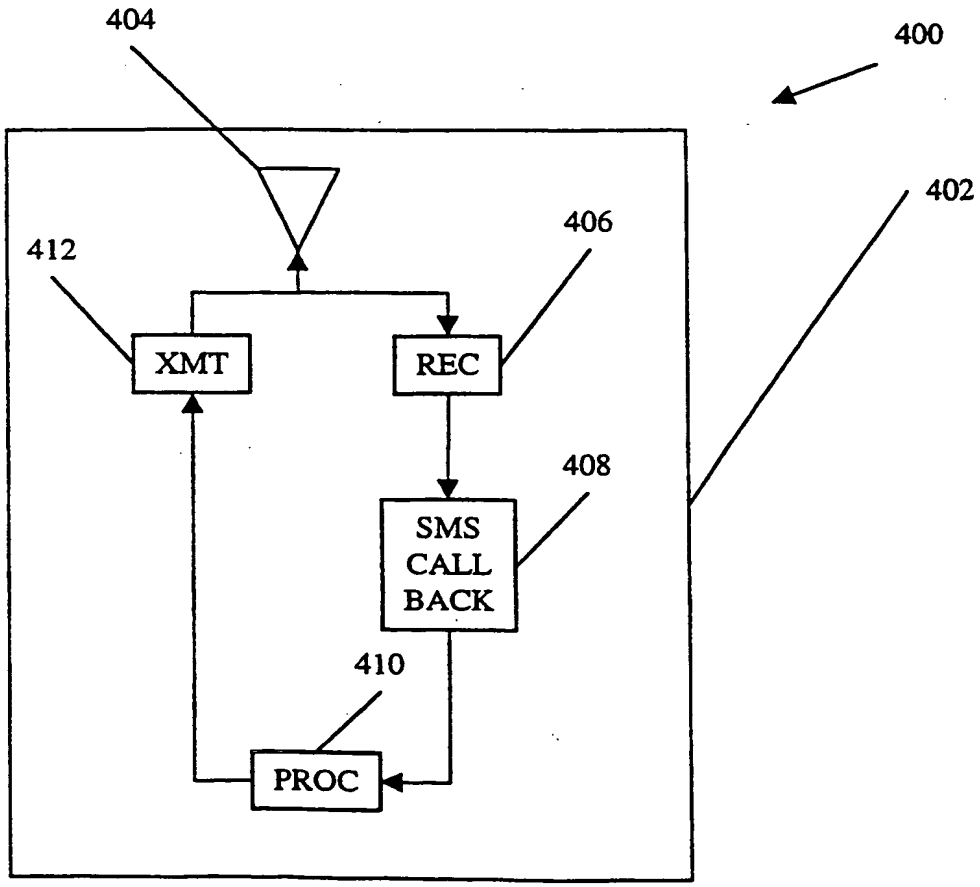
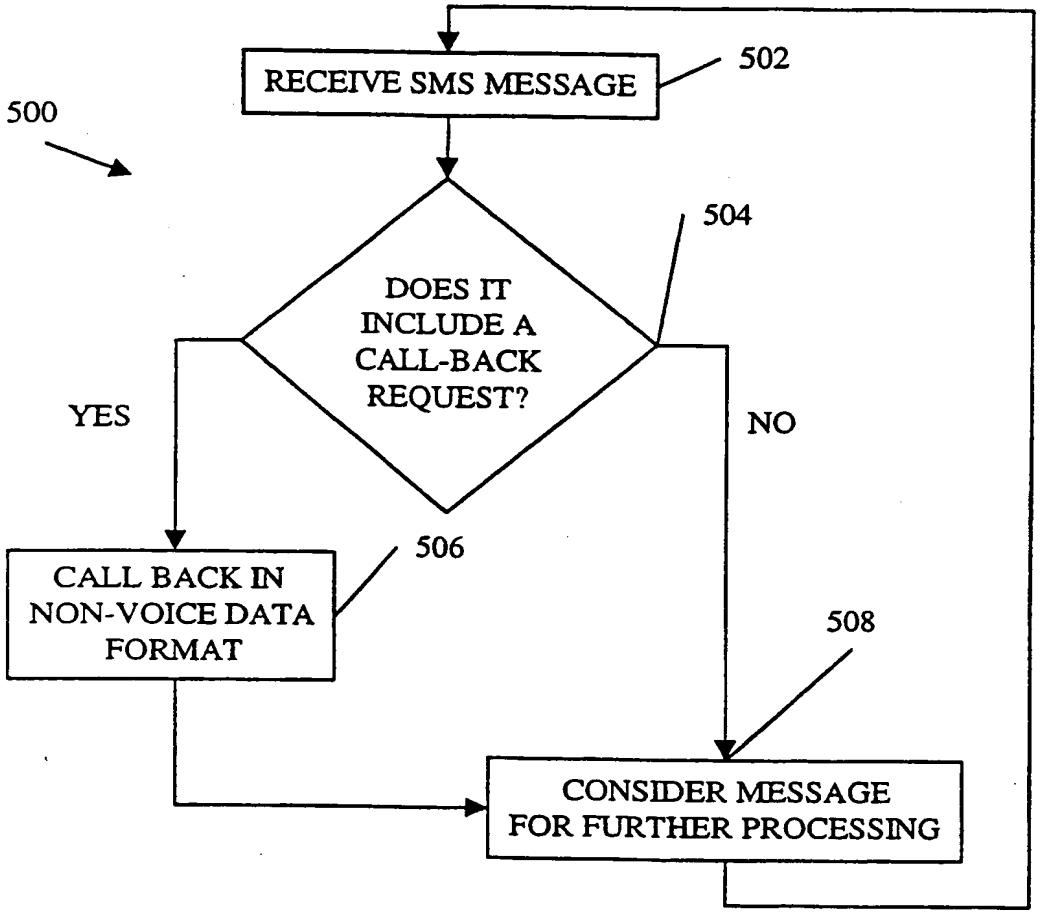


FIG. 5



INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/24300

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q11/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04Q H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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